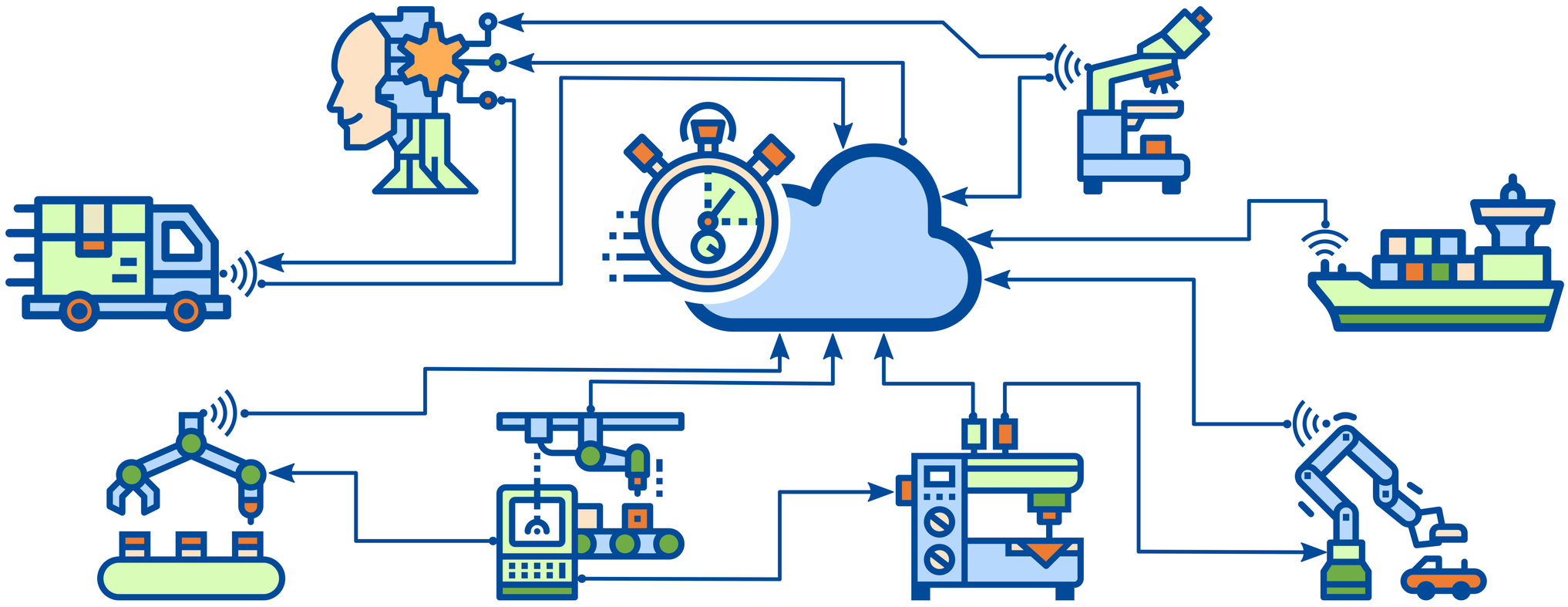
Universität Rostock

Traditio et Innovatio

Realtime Publish/Subscribe for the Industrial Internet of Things

Eike Schweissguth[1], Helge Parzyjegla[2], Gero Mühl[2], Dirk Timmermann[1], and Peter Danielis[3]



Realtime Systems

The timely delivery of messages between sensors, computation units, and actuators is crucial for the reliability and safety of many systems in different application domains, e.g., in the automotive or aerospace area. With the ongoing integration of applications, machines, robots, and processes in the *Industrial Internet of Things* (IIoT), it is expected that the number of application scenarios with realtime requirements of varying strictness will continue to grow in size, numbers, and complexity.

Publish/Subscribe Communication

Smart manufacturing and *smart factories* require maximum flexibility in terms of space, time, and organization. Publish/subscribe communication has shown to flexibly support versatile interaction patterns. Nevertheless, for its application in an industrial environment, it still lacks assured guarantees for hard realtime constraints. However, with the advent of software-defined networking and new realtime standards for networking such as *Time-Sensitive Networking*, this is about to change.

Research Objectives

In this project, we work on a converged network infrastructure for the *Industrial Internet of Things* (IIoT) in a smart factory. In particular, we aim to support publish/subscribe communication offering flexible m:n *multicast* interactions at the network layer in which publishers and subscribers may send and receive with multiple data rates (*multi-rate*) and messages have realtime constraints of varying strictness (*multi-class*), e.g., hard deadlines, reserved bandwidth, and best effort.

Project Information

The project is funded by Deutsche Forschungsgemeinschaft (DFG, German Research Foundation). The first project phase started in September 2019 and has a duration of 30 months. Considering the flexibility of publish/subscribe and the reliability of realtime communication, the project works on core ingredients of future networks that are currently in the focus of industry and academia. We are always looking for qualified, highly motivated students who want to join our team. We offer exciting opportunities to get involved by writing a thesis, participating in a lab project, or taking responsibility in a student job. Do not hesitate to contact us with any question you may have.

[1] Rechner in Technischen Systemen | Institut für Angewandte Mikroelektronik und Datentechnik | Universität Rostock

[2] Architektur von Anwendungssystemen | Institut für Informatik | Universität Rostock

[3] Verteiltes Hochleistungsrechnen | Institut für Informatik | Universität Rostock